

World-first Total Body PET/CT scanning technology to transform the way we detect and treat cancer.

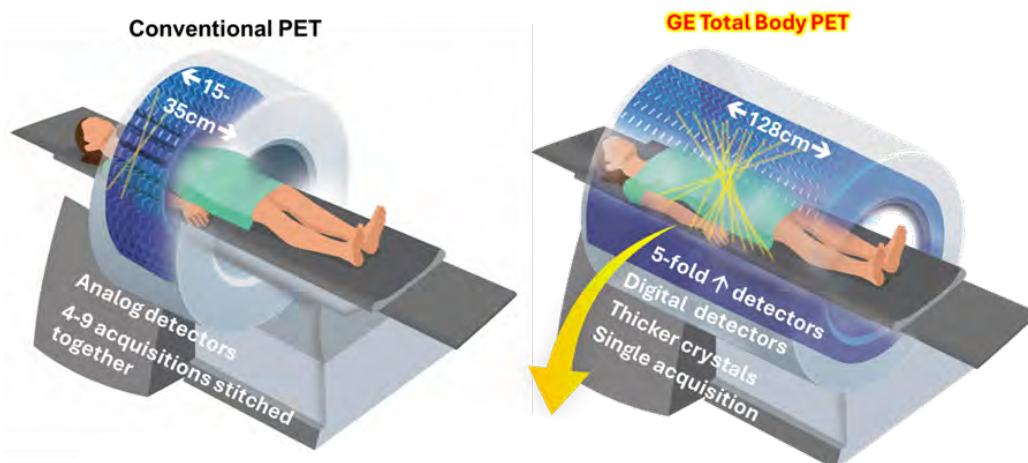
Project Title	ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics
Lead Institute	Peter MacCallum Cancer Centre, Melbourne
Focus Area	Accelerating the development of new scans and targeted treatments to improve outcomes for people with cancer
Cancer Types	All cancers

Challenge and Opportunity

Over the past few decades, researchers around the world have been intent on improving the sensitivity and resolution of positron emission tomography (PET) imaging. PET scanning is a nuclear medicine imaging test that uses a radioactive tracer to show how well organs and tissues are working and is used as a diagnostic tool for cancers. Whilst many novel modifications have remarkably improved PET quality, the limited axial coverage of current PET scanners continues to be a significant constraint.

To overcome these limitations, Total Body PET scanners were developed, thus extending the axial field of view to cover the entire human body. By increasing the number of detectors, most emitted photons can be captured, which dramatically increases sensitivity and allows for simultaneous dynamic acquisition from all tissues of interest.

Ultimately, this ultrasensitive, high-performance device offers many advantages over conventional systems, such as an enhanced image quality, shorter acquisition time, and less injected radioactivity.



Project in Brief

The ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics will spearhead installation of a world-first next-generation, Total Body PET/CT, representing a major advance in human scanning, enabling accelerated development of cancer imaging and therapeutics to support prevention, early detection and advanced cancer research programs.

To be installed in 2025, this will be the first GE Healthcare Total Body PET installation in Australia (and likely globally) - one year ahead of global commercial availability. This commitment from GE Healthcare represents an unprecedented opportunity for cancer research in Australia, highlighting the outstanding track record of the team that will take full advantage of this novel platform.

The Centre will leverage and accelerate several existing and integrated research programs, developing first-in-class radiolabeled molecules pinpointing a range of targets, utilising new technologies that will enable rapid translation from laboratory to patients.

With clear focus, this will enable development of radiotracers in areas of unmet need, including tumour-specific binding, new predictive biomarkers with a focus on imaging immune response, novel paediatric indications, specific infection imaging and tracking of cell therapies. The team will also develop next generation radionuclide therapy with Auger, alpha and beta emitters for a variety of cancers. The visionary leadership of their globally recognised investigators will enable ambitious goals to translate breakthrough radiotracers to the clinic.

TECH TALK

The power behind the team

Peter Mac has been at the forefront of developing PET/CT with installation of the one of the first clinical PET scanners globally (1995) and fourth PET/CT (2002). Since then, their research has revolutionised cancer imaging, improving outcomes by combining functional and anatomic imaging for precise tumour localisation. They have also pioneered theranostics - the use of radioactive molecules for both “therapy” and “diagnostics” - introducing Lutetium-177 (¹⁷⁷Lu) into the clinic (2005). More recently, the team led pioneering research leading to adoption of PSMA PET/CT (2014) and PSMA theranostics (2015) globally which has been a game-changer for improving outcomes in prostate cancer. The group is now leading translational and clinical research involving a large portfolio of radiotracers to translate to the clinic, which promises to improve cancer detection, treatment and management.

The ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics will build on these achievements, with installation of a next-generation Total Body PET and fully integrated preclinical translational centre.

“The ACRF Centre will be at the forefront of developing next-generation cancer scans and treatments, with real potential for global adoption in less than 10 years, seeking cures and significantly improving the lives of people with cancer.”

*Professor Michael Hofman,
Chief Investigator*



The Benefit

The ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics will develop next-generation cancer scans and treatments, improving the lives of patients with a variety of cancers and shaping the future of cancer care.

The platform allows for very quick scanning of the entire human body at a molecular level. This technology opens up new possibilities, such as:

- Dynamic pharmacodynamic imaging: this helps researchers test and confirm new types of imaging agents that target tumours
- Immune system imaging: This allows for better visualisation of how the immune system is functioning
- Cell tracking: This helps in monitoring the movement and behaviour of specific cells in the body

Moreover, it will seamlessly integrate with state-of-the-art radiopharmaceutical sciences and pre-clinical imaging at Peter MacCallum Cancer Centre. This enables rapid translation from laboratory to the clinic, enhancing the capability to develop pioneering radiotracers for both diagnostic and therapeutic purposes.

Such advancements are critical in radically improving patient outcomes in cancer therapy.

The Centre aims to enhance patient outcomes by embracing a future where cancer treatment is personalised. This work will undoubtedly improve the lives of people with a variety of cancers, in Australia and across the world.



Use of Funds

The \$10M investment will support the development of the ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics.

Peter Mac has been at the forefront of developing PET/CT and theranostics to improve patient outcomes for decades. This funding supports and builds on existing infrastructure and programs already thriving at Peter Mac and across Australia to lead Australian discoveries for positive patient outcomes.

Technology	Cost
Contribution to Total Body PET/CT (GE Omni 128cm) Co-contributions will be made by Melbourne University and Peter Mac	\$8,517,255
Gamma-eye small animal SPECT	\$287,228
Beaquant-S digital multi-isotope autoradiographic system	\$374,500
LigandTracer Yellow	\$221,017
Salary support – TB-PET and Clinical researcher Further salary support will be provided by National Imaging Facility, Peter Mac and GE Healthcare	\$600,000
Total	\$10,000,000



Beaquant-S digital multi-isotope autoradiographic system



Gamma-eye small animal SPECT

“In line with ACRF “Backing Brilliant”, eleven named young investigators will ensure the next generation of researchers are mentored and upskilled”.

Kerry Strydom , ACRF CEO



Meet the Team

This is an unrivalled multidisciplinary team who have recently pioneered novel scans and treatments leading directly to three FDA-approvals in the last three years. To bolster the research, Peter MacCallum Cancer Centre will be partnering with leading institutions - Stanford University Medical Centre (USA) and University Hospital Essen (Germany) - who will synchronously install this new platform, enabling collaboration between global pioneers.

National expertise will be leveraged through partnering with the National Imaging Facility (NIF) and the Australasian Radiopharmaceutical Trials Network (ARTnet).



Chief Investigator
Michael Hofman (co-lead)
Head of PET/CT; Director, ProSTIC;
Peter MacCallum Cancer Centre



Chief Investigator
Linda Mileshekin (co-lead)
Director of Medical Oncology,
Peter MacCallum Cancer Centre

Chief Investigator Dale Bailey

Principal Physicist, Department of Nuclear Medicine, Royal North Shore Hospital;
Medicine & Health, University of Sydney.

Chief Investigator Roslyn Francis

Chair, Australasian Radiopharmaceutical Trials Network (ARTnet)

Chief Investigator Luc Furic

Head of Translational Prostate Cancer Research, Peter MacCallum Cancer Centre/VCCC

Chief Investigator Ken Herrmann

Chair, Nuclear Medicine, Essen, Universitätsmedizin Essen, Germany

Chief Investigator Andrei Iagaru

Chief, Molecular Imaging, Stanford University Medical Centre, USA

Chief Investigator Leigh Johnston

National Imaging Facility (NIF) Node Director, University of Melbourne

Chief Investigator Sze-Ting Lee

Deputy Director, Nuclear Medicine, Austin Health

Chief Investigator Declan Murphy

Director of Genitourinary (GU) Oncology, and Director of Robotic Surgery, Peter MacCallum Cancer Centre

Chief Investigator Helen Nadel

President, SNMMI; Director of Pediatric Nuclear Medicine, Stanford University, USA

Chief Investigator Shankar Siva

Radiation oncologist, Peter MacCallum Cancer Centre

Chief Investigator Price Jackson

Lead Medical Imaging Physicist, Peter Mac; Prostate Cancer Foundation Young Investigator

Chief Investigator Kate Burbury

Executive Director, Digital Healthcare Innovation

Chief Investigator Mohammad Haskali

Head of Radiopharmaceutical Sciences, Peter MacCallum Cancer Centre

Chief Investigator Grace Kong

Theranostics Lead, Cancer Imaging, Peter MacCallum Cancer Centre

Chief Investigator Shahneen Sandhu

Medical Oncologist, Peter MacCallum Cancer Centre

Chief Investigator Anna Trigos

Group leader, Computational Biology Program, Peter MacCallum Cancer Centre

ACRF Model for Impact

With input from health economic specialists, Australian Cancer Research Foundation (ACRF) has developed a framework to articulate the anticipated future impact of projects that receive ACRF funding. Below is an overview of the outcomes the ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics has the potential to achieve:

HUMAN

- In 2024, it is estimated 169,500 Australians will be diagnosed with cancer and 53,000 will die¹. Total body imaging using PET/CT provides superior sensitivity and resolution when combined with theranostics and is set to revolutionise cancer treatment and improve the outcomes for people with cancer². The equipment available in the ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics will ensure that Australia is at the forefront of these advances.
- Theranostics has proven to be an effective approach for the treatment of solid tumours such as breast and prostate. In the case of prostate cancer even better outcomes have resulted using whole body scanning to select those patients mostly likely to benefit^{3,4}. Research undertaken in the ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics will accelerate and expand the application of theranostics and whole-body scanning to other cancers so that a greater number of people can benefit.

SOCIETAL

- The ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics has the potential to reduce the burden on caregivers who, when considering time spent caregiving for loved ones, work absenteeism and presenteeism, experience a 23% work productivity loss because of caregiving^{6,7}. Based on the average Australian wage, and taking into consideration the labour force participation and unemployment rate, this accounts for an annual productivity loss of \$14,467 per caregiver annually.
- Almost half of Australian adults of working age with cancer are not in the workforce – resulting in a reduction of GDP of around \$1.7B⁸. Improved disease management and more effective treatments that will be developed in the ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics has the potential to improve the quality of life for people with cancer including their employment potential.

LEVERAGE

- Over the last five years the research team have secured over \$100M in competitive grant funding. The investment in the ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics would significantly strengthen future grant applications and secure additional funding.
- Of the \$78B net present gains generated by medical research from 1990 to 2004, \$52B was in the form of health gains and \$26B in wider economic gains⁵. Extrapolating these figures, the \$10M invested by ACRF has a potential return of \$39M - \$26M in the form of health gains and \$13M in the form of wider economic gains.
- Additional funding totalling \$9M will be provided by collaborating organisations including the National Imaging Facility and GE. A further \$1.8M will be provided through ACRF's funding partners further including Cancer Institute NSW and Ovarian Cancer Research Foundation.

INTELLECTUAL

- Jobs in medical research are high value and knowledge-based jobs that contribute substantially to the economy. The core team alone has the potential to generate significant value added gain⁵.
- One of the most important outputs of the ACRF Centre of Advanced Imaging-Guided Cancer Therapeutics will be publications to inform future research. The \$10M invested by ACRF alone has a potential return of 116 publications⁹.

For references, please visit acrif.com.au/philanthropy-accelerate-references

B A C K I N G

B R I L L I A N T

To find out more about ACRF Accelerate and this exciting project please contact philanthropy@acrif.com.au 1300 884 988

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